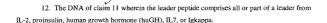
CLAIMS

We claim:

- A polypeptide having the structure X-Y wherein X is selected from the group consisting of an Ala residue and heterologous peptides capable of adopting a stable secondary structure and Y is a soluble CD39 polypeptide selected from the group consisting of:
- (a) polypeptides having an amino acid sequence as set forth in Figure 1 (SEQ ID NO:2) wherein the amino terminus is selected from the group consisting of amino acids 36-44, and the carboxy terminus is selected from the group consisting of amino acids 471-478;
 - (b) fragments of the polypeptides of (a) wherein said fragments have apyrase activity; and
 - (c) variants of the polypeptides of (a) or (b), wherein said variants have apyrase activity.
- 2. The polypeptide of claim 1 wherein Y is a soluble CD39 polypeptide selected from the group consisting of:
- (a) polypeptides having a sequence consisting of amino acids 38-476 or 39-476 of SEQ ID NO:2:
- (b) variant polypeptides that are at least 70% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity;
- (c) variant polypeptides that are at least 80% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity:
- (d) variant polypeptides that are at least 90% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity;
- (e) variant polypeptides that are at least 95% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity;
- (f) variant polypeptides that are at least 98% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity; and
- (g) variant polypeptides that are at least 99% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity.
- The polypeptide of claim I wherein X is a peptide fragment from the amino terminal portion of mature IL-2, CD39-L2, CD39-L3, or CD39-L4.

- 4. A polypeptide having the structure A-B-Y wherein A is 0-20 amino acids from the amino terminal portion of mature IL-2, B is a linker of 0-15 amino acids, and Y is a soluble CD39 polypeptide selected from the group consisting of:
- (a) polypeptides having an amino acid sequence as set forth in Figure 1 (SEQ ID NO:2) wherein the amino terminus is selected from the group consisting of amino acids 36-44, and the carboxy terminus is selected from the group consisting of amino acids 471-478;
 - (b) fragments of the polypeptides of (a) wherein said fragments have apyrase activity; and
 - (c) variants of the polypeptides of (a) or (b), wherein said variants have apyrase activity.
 - 5. A soluble CD39 polypeptide comprising a sequence selected from the group consisting of:
- (a) SEQ ID NO: 6, amino acids 25-464 of SEQ ID NO:27, amino acids 25-474 of SEQ ID NO:28, amino acids 27-473 of SEQ ID NO:29, amino acids 21-476 of SEQ ID NO:3, amino acids 21-476 of SEO ID NO:4, or amino acids 21-463 of SEO ID NO:30: and
- (b) fusion polypeptides comprising the polypeptides of (a), wherein said fusion polypeptides have apprase activity.
- 6. The soluble CD39 polypeptide of claim 5 having an amino acid sequence selected from the group consisting of SEQ ID NO: 6, amino acids 25-464 of SEQ ID NO:27, amino acids 25-474 of SEQ ID NO:28, amino acids 27-473 of SEQ ID NO:29, amino acids 21-476 of SEQ ID NO:3, amino acids 21-476 of SEO ID NO:4, and amino acids 21-476 of SEO ID NO:30.
- 7. The soluble CD39 polypeptide of claim 6 having the sequence of amino acids 21-463 of SEO ID NO:30.
 - 8. An isolated nucleic acid encoding a polypeptide of claim 1.
 - 9. The nucleic acid of claim 8 wherein said nucleic acid is DNA.
 - 10. The DNA of claim 9 having a sequence selected from the group consisting of:
 - (a) SEQ ID NO:5; and
- (b) DNA sequences which, due to degeneracy of the genetic code, encode the polypeptide encoded by SEQ ID NO:5.
- 11. The DNA of claim 9 wherein said DNA further encodes a leader peptide operably linked to the N-terminus of the polypeptide, wherein the leader peptide facilitates the extracellular secretion of the polypeptide.



- 13. The DNA of claim 12 wherein the leader peptide comprises the sequence SEO ID NO:9.
- 14. The DNA of claim 11 having a sequence selected from the group consisting of
- (a) SEO ID NO:7; and
- (b) DNA sequences which, due to degeneracy of the genetic code, encode the polypeptide encoded by SEQ ID NO:7.
 - 15. A vector comprising the nucleic acid of claim 8.
 - 16. The vector of claim 15 wherein said vector is a eukaryotic expression vector.
 - 17. A recombinant cell comprising the nucleic acid of claim 8.
 - 18. The cell of claim 17 wherein said cell is a prokaryotic cell.
 - 19. The cell of claim 17 wherein said cell is a eukaryotic cell.
 - 20. The cell of claim 19 wherein said cell is a COS cell or a CHO cell.
- 21. The cell of claff 20 wherein said cell is a CHO cell that has been adapted to grow in suspension and in the absence of serum.
- 22. A process for preparing a soluble CD39 polypeptide comprising culturing a recombinant cell according to claim 17 under conditions that permit expression of the CD39 polypeptide and recovering the CD39 polypeptide from the culture.
 - 23. The process of claim 22 wherein the recombinant cell is a eukaryotic cell.
- 24. The process of claim 22 wherein the recombinant cell is a CHO cell that has been adapted to grow in suspension and in the absence of serum.
 - 25. A polypeptide produced according to the process of claim 22.
 - 26. A polypeptide produced according to the process of claim 24.

- 27. A composition comprising a pharmaceutically acceptable carrier and a polypeptide according to claim 1.
- 28. A composition comprising a pharmaceutically acceptable carrier and a polypeptide according to claim 5.
- A composition comprising a pharmaceutically acceptable carrier and a polypeptide according to claim 25.
- 30. A method of inhibiting angiogenesis in a mammal in need of such treatment comprising administering a therapeutic amount of a soluble CD39 polypeptide.